

The Potential of Renewable Energy Technologies in Wisconsin: Agricultural Anaerobic Digestion

Notes from Meeting: February 23, 2005
(8:30 AM – 11:00 AM)

A draft narrative document providing background material about the three renewable energy markets was distributed by e-mail prior to the meeting. *Portions of this narrative are included and appear in italics.* The following meeting notes are organized around the Discussion Outline distributed at the meetings.

Attendees:

John Katers, STS (Focus on Energy Renewable Energy Program)
Norman Bair, WI DOA Division of Energy
Bill Johnson, Alliant Energy
Larry Krom, L&S Technical Associates (Focus on Energy Renewable Energy Program)
Barbara Samuel, WI DOA Division of Energy
Scott Olsen, MG&E
John Ness, Xcel Energy
Paul Helgeson, PSCW
Carl Siegrist, WeEnergies
Laura Williams, MGE
Don Wichert, WECC (Focus on Energy Renewable Energy Program)
Ingrid Kelley, ECW

Resource Characterization: Agricultural Anaerobic Digestion

There are over 1.2 million cows on Wisconsin dairy farms. The average number of cows per farm is 81, and there are over 15,000 dairy herds in the state.¹ At present, estimates for the economically efficient use of manure as a source of methane to produce electricity and heat require at least 500 cows. According to the 2002 Census of Agriculture – State Data, there are 189 dairy farms in Wisconsin with herds of at least 500 head. If efficient systems could be developed for herds as small as 200 head, an additional 650 farms could become potential producers of methane for electric and heat energy. Other types of livestock operations could be considered as well.

The most economically efficient methane systems utilize the heat produced by the generator and incorporate the digester's solids into the farm's production cycle as animal bedding or for other uses. The whole system also serves the farm operation as a primary odor reduction strategy.

¹ 2004 Dairy Producer Survey, Wisconsin Agricultural Statistics Service, December 2004

Market Channels and Actors

Large dairy farms and CAFOs (Confined Animal Feeding Operations) are the most likely market for this technology in the near term, but cooperative models for smaller farms could become an important source. Specific players mentioned:

- Dairy operations with 500+ cows (or 720 animal units)
- Poultry operations (720+ animal units)
- CAFOs (with 1000+ animal units, regulated by EPA for manure management)
- 150-500-head operations, depending on development of smaller systems technology
- Utilities
- Third-party energy developers
- Focus on Energy
- System Vendors
- Solids can be spread closer to other homes and at different times than before

Motivations for Using Anaerobic Digestion on Farms in Wisconsin:

The group agreed that specific motivating factors add up to a systems approach where the anaerobic digester provides a number of economic incentives beyond energy production.

A number of potential motivators were mentioned:

- Solids provide a source of animal bedding
- Odor control
- Relieves disposal problems and costs
- Reduces pathogens
- Source of both heat and electricity
- Reduction of weed seeds
- Helps meet CAFO regulation standards
- Decreases pest control costs
- Assists with nutrient management (phosphorus)
- Eligible for USDA grants
- Available tax/investment credits
- Can use additional or alternate feedstocks
- The potential growth of the market for green credits

Barriers to Adoption of Anaerobic Digestion on Farms in Wisconsin:

A primary barrier continues to be the minimum size of operation for which this technology is cost-effective. Other barriers that were mentioned:

- The up-front costs of installing a system
- Farmers may be reluctant to take on the O&M responsibilities for such a complex system (they would rather stick to farming)
- Lack of operator expertise
- 3-phase power is not always available to the farm
- Liability issues surrounding the gen-set
- Inconsistent incentives skew the timeline and coordination of projects
- Technology development curve is relatively immature
- Solids market is uncertain

- Lack of thermal infrastructure on-site to use heat
- Low buy-back rates for electricity
- Uncertainty about technology
- Anti-growth sentiment against large farms (NIMBY)
- An immature REC market

Program Approaches

The following are specific programs that should be used as models for estimating achievable potential for anaerobic digestion in Wisconsin:

- Coordinated and customized technical assistance program
 1. USDA grants
 2. State-level incentives
 3. Financial facilitation
 4. Technology evaluation
- Buyback rates
- Project incentives
- Business model templates:
 1. Owner-operated
 2. Cooperative
 3. Third-party partnership
 4. Demonstrations of these models (look at European models)
- Education programs:
 1. Partnerships/coordination with environmental organizations
 2. Raising public awareness about the technology
- RPS set-aside for anaerobic digestion
- Green pricing opportunities

Additional Comments, Suggestions and Resources

1. For cooperative digesters: the most practical technology at present for transporting manure short distances is pumping – within 12-15 months, demos will be developed in other states
2. Check out resources of the Wisconsin Biogas Development Group
3. Steve Dvorak has information about a coop model that is third-party managed.
 - a. There is a Washington/Oregon facility shared by four farms within a three-mile radius with 12,000 total cows (Bill Johnson)
4. Cows can use the solids for bedding but other livestock does not use bedding; poultry manure is next most likely economic feed stock CAFOs over 1000 animal units need to do something about manure management (L Krom has map of CAFOs in Wisconsin)
5. Financing is easier for farms nearer urban development because their land is worth more per acre than the more rural operations
6. Look at activities in other states: California (look at AG Star website), New York, Vermont (green pricing program from AD, 9 cents/kWh buyback), Iowa (Iowa State University Leopold Center), New Jersey (AD set-aside?)
7. Each digester is a “one-off” design – as technology stabilizes, greater and faster benefits will accrue

8. Cut-off size? Cogen limit? Can use of heat only be economically viable?
9. Evaluate: Farms large enough for co-gen and farms that would benefit from harnessing the heat
10. There are demonstrations being developed to store methane in order to use anaerobic digesters as peaking plants, and to clean up the gas so it can be injected into the natural gas pipeline
11. *"Anaerobic Digesters and Methane Production"* from Alliant Energy outlines market potential for anaerobic digestion in Wisconsin
12. We need to define how many potential farms are not in FOE territory
13. One drawback of communal systems is necessity for all parties to make long-term commitment; urban sprawl will eventually force out farms